EMO

Service Instruction

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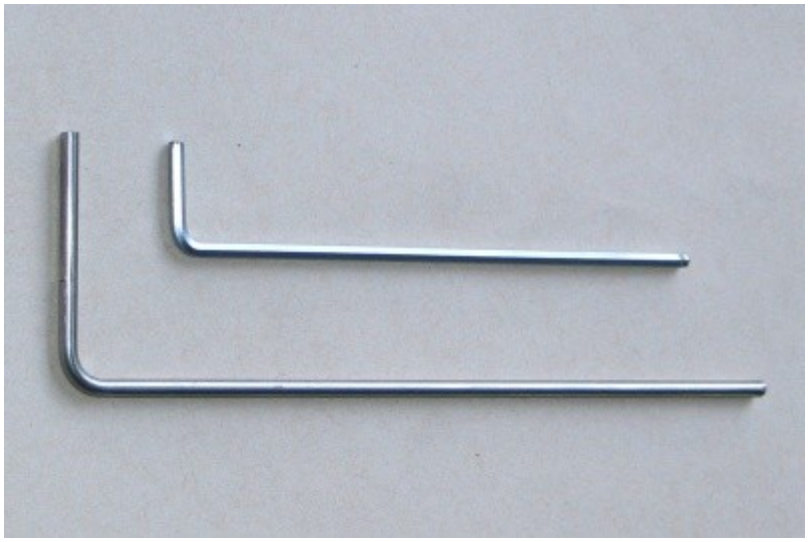
Special Tools

Before starting make sure that all tools are available. Besides a set of normal blade screw drivers you will need some special tools.

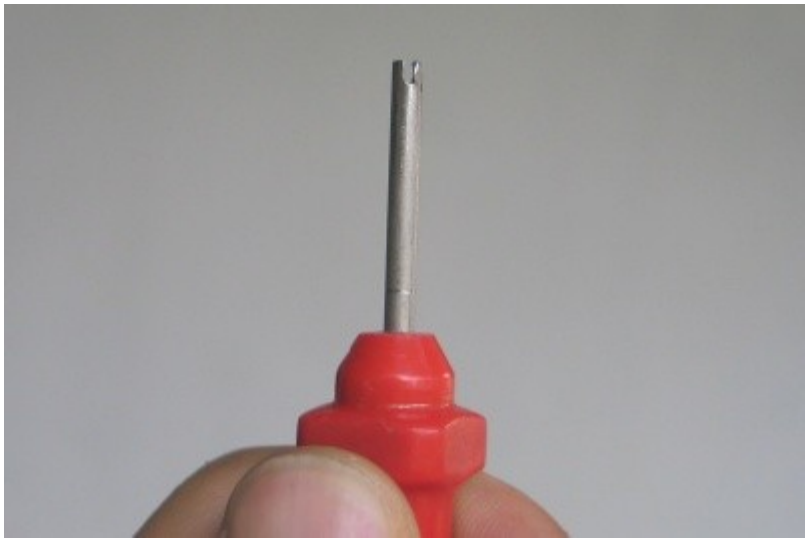
1. For opening the EMO:
   Allen key 3/32'' (or 2.3mm)
2. For leakage test:
   Pressure gauge with plugs
3. Special EMO tools:
   - Setting gauge
   - Tool for taking out springs
   - Tool for taking out the rotor
   - Tool for taking out the filler
   - Tool for rotor counter nut
   - Tool for taking out the filler
4. Alcohol, Vaseline



Here the special EMO tools:

For calibration a setting gauge is needed. It is a simple piece of bent metal with a diameter of 2.5mm. An allen key of the same size also works fine.

(down the original tool)



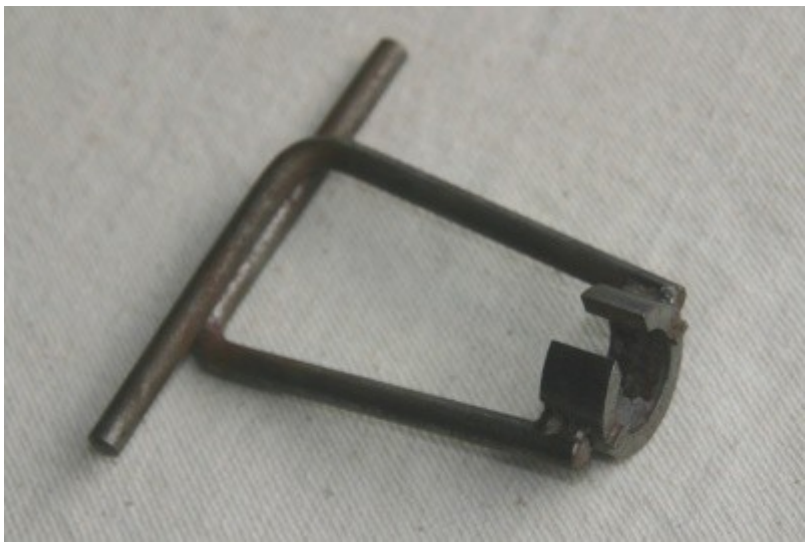
For turning the springs out of the pointer such a tool helps you a lot. It is an old screw driver (diameter 3mm) with a slit.
If you are experienced you can try to turn out the springs with strong forceps. In my opinion it is faster and easier to build such a tool than getting out the springs with forceps.

For holding the counter nut of the rotor while adjusting you need a socket with a handle. It's a nice tool but not really necessary. You also can hold a simple 8mm socket with pliers.

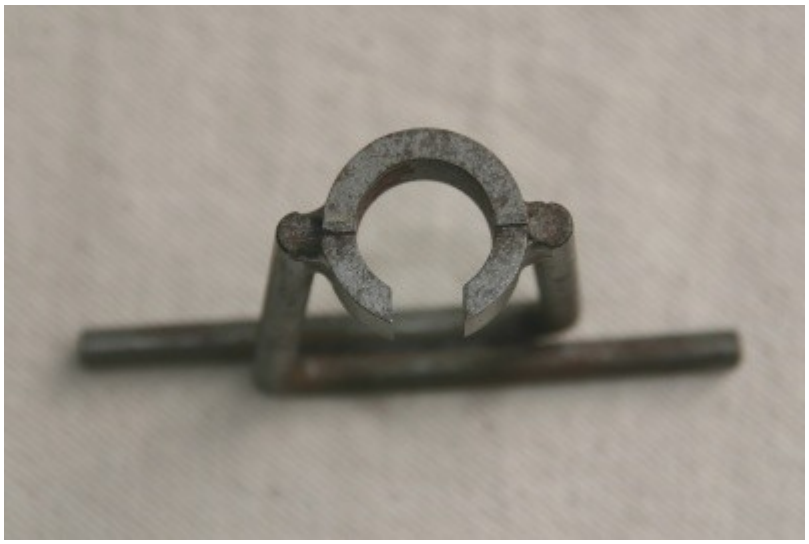
This tool helps you to lift out the rotor. Unfortunately it is difficult to make and does not work so well.

By now I have no idea how to create a better tool. Maybe you have an idea...

The inner diameter is 28mm.
To grab into the notches of the rotor shaft there must be at least one nose. In this case it is a 5mm bolt placed half in the ring.



This a tool for taking out the filler unit.
It is difficult to make (and to describe) but you will need it only if you really want to take out the filler...



Do you really want to take out the filler and build it?
Here are the measurements:

Take a 1" pipe (4 mm strong) and saw a 9mm cut. Now you need 2 little noses with a hight of approximately 1.5mm. The easiest way to take material from the pipe is with a file and leaving the two noses blank.

The handle is not important but of course it must be higher than the filler.

Disassembling Mixing Chamber

Step 1

Clean the whole unit to make sure that no dirt gets inside while working with the open unit.

Ether would be perfect, but alcohol also works.

Step 2

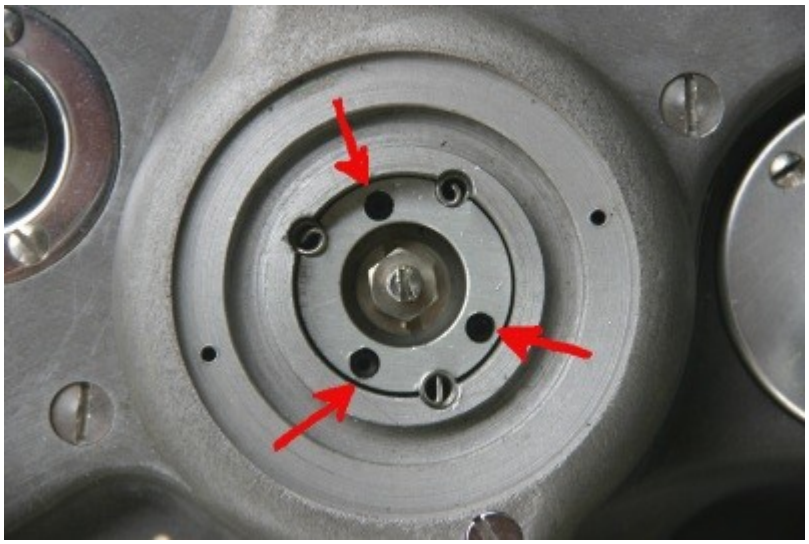
Remove the handle on top.
(2 screws)

Step 3

Remove cover.
(2 screws)

Step 4

Lift out the spring.



Step 5

DO NOT TOUCH THE 3 SCREWS.

Step 6

Remove the screw of the pointer.

It is only a cover screw and hides an allen key screw which you have to remove later.

Step 7

Remove the 3 springs. A special tool is needed.
See Tool Section.

Even with the special tool it is a very tricky procedure.
Because there is no thread you have to turn the springs **anti-clockwise** to reduce their diameters while pulling them out.
That sounds easier than it is...

Step 8

Now the pointer turns free, but the rotor is still attached.
Turn the lever now to 6%.
Now through the hole of the lever an allen key screw appears (3/32'').
Remove the screw.

Step 9

Remove the lid.
(8 screws)

Don't forget the screw in the centre under the lever.

Step 10

Now you have to lift out the rotor.
Loosen the nut with the socket key until the end.
Don't take out the screw completely.

Step 11

Now screw the axle in the centre **clockwise.**
The rotor must come out slowly.

If the rotor is stuck lubrication around the rotor helps a lot.
Give the oil time to penetrate.
The perfect lubrication is a mixture oil and ether.

Step12

The rest you have to do with the special wrench.
Put on the wrench and move the rotor from side to side and lift it simultaneously.
Use the wrench only. Do not take a pair of pliers. You will destroy the shaft.

Step 13

Clean the rotor and the wall with ether.

For heavy dirt and particles use metal polish and a cloth. **NEVER** use sand paper or a file. You will create massive leaks!

Step 14

Now clean the mixing box chamber and the gasket with ether or alcohol.

Check gasket for damages.

Step 15

Check the closing mechanism of proper functionality.

Warning: Do not press the button too deep. If you do so the gasket will come out of the button and you have to dismantle the whole mechanism to bring it back in place.
If this already has happened see the Closing Mechanism section.

Step 16

Lubricate the rotor very slightly with vaseline.

Assembling Mixing Chamber

Step 17

Set the rotor back in place.
If this is difficult even with vaseline turn the rotor and try another position. Note the cuttings of the rotor and the inlet and outlet of the chamber and take the original position.

Step 18

Screw out the screw (anti-clockwise) and push the rotor down.
The exact positioning of the rotor comes later.

Step 19

Clean the mixing chamber.

Inspect the vaporizer chamber.
If it is very dirty inside fill in ether, stir up and wash it out through the filler unit.

Replace the seal.

Step 20

Replace the lid.
(8 screws and
1 allen key screw with
1 cover screw of the pointer)

Step 21

And now the tricky part: Replacing the springs.
Turn the pointer and rotor into the correct position so that the holes for the springs appear.
Now put the springs in. Use the special tool, turn **anti-clockwise** to reduce the diameter of the springs and press them down.

Step 22

Remember, there are no threads so do not turn clockwise! You will open the springs and then the springs get damaged.
If you already have a damaged spring with a little luck and skill you may repair it.

Adjustment Rotor / Level Indicator Unit

Step 23a

For adjusting the rotor you first have to take out the level indicator. Therefore you have two options. First the correct one:

Just loose the 3 screws
(2-4 turns)
and pull the whole unit out.
That is probably difficult because the unit usually is stuck. So turn it right and left and rock it slightly. Use your hands only - no tools.

Step 23b

If it is not possible to take out the whole unit turn out the screws completely and lift only the upper part of the unit out of the EMO.

But watch out for the thin plastic washer.
The washers hold the distant tubes in place. They are not so important but must not fall into the main chamber.

Clean and check everything, especially the gasket.

Continue with the rotor adjustment.

Step 24

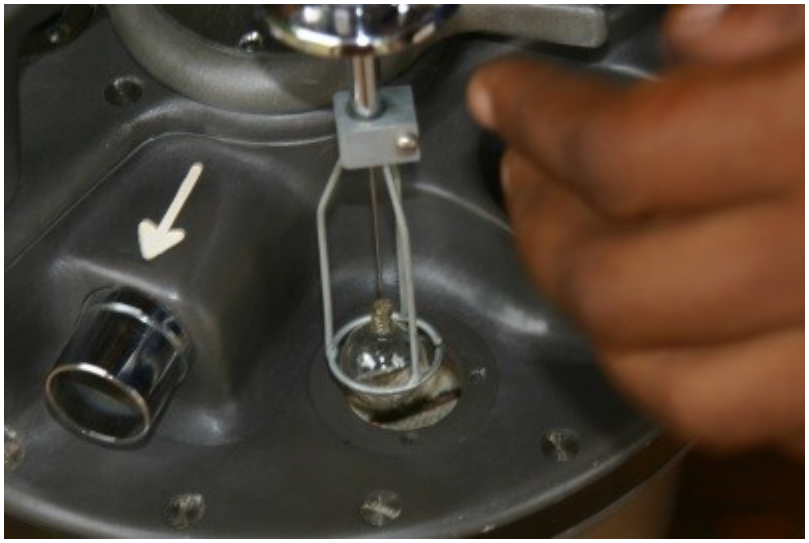
The adjustment is made by setting the vertical height of the rotor. Turn the pointer to approximately '4'. Insert the setting gauge in the slit between the rotor and housing. The rotor is correct adjusted when the setting gauge fits without backlash.
To reduce the slit turn the adjustment screw clockwise. To open the slit loose the screw and press the rotor down.

Step 25

After the adjustment secure the screw and pointer by screwing the counter nut tighter. Make sure that the screw is not turning.

Replace the cover of the pointer. (2 screw)

Temperature Compensating Unit



Step 26

Remove the Temperature Compensating Unit.
(3 screws)
Be careful. The glass ball is fragile.
Look for dirt and check gasket.
If possible do only a visual inspection - you can destroy more than you can repair.

Put it back into its place carefully.

Filler Unit

Step 27

Take out the Filler Unit with the special tool.

Step 28

Clean everything and check the function.
The valve should move easily.
Check the gasket.

Put the unit back into the EMO.

Leakage Test

Step 29

For the leakage test you need a pressure gauge and 2 rubber plugs.

Note: Before using the test equipment check the pressure gauge itself for leakage.

Step 30

Connect pressure gauge on one side and lock the other side with a plug. Set the pointer between 1 and 20. Do not leave the pointer on the release valve.
Pump up the system with approximately 150 mmHg. The pressure must be stable, but a pressure loss of up to 10 mmHg in 10 sec. is acceptable.
If the test is OK press the release valve down. Air must be released now.

Step 31

But most likely you will have leakage problems

Do the following:
1. Check your test equipment
2. Screw all screws tight
3. Is the filler closed?
4. Take a closer look to the release valve. It is always a source of problems.

Tip: A soap solution spread out with a brush on all the gaskets is a very good indicator for leakages. Even the smallest leakages will immediately create bubbles.
For the solution just take some drops of dish washing liquid.

Closing Mechanism (Release Valve)

Step 32

The closing mechanism is the most sensitive part of The EMO. If possible leave it in the lid.

But if you have problems (probably leakages) here are images that helps you to dismantle and mantle.

Step 33

For removing the closing mechanism turn the two screws for 2 or 3 turns only.

The third screw is for adjusting. Do not turn.

Step 33

Two little hooks inside will swing in and leave the unit free.

Step 34

Clean everything carefully and watch for damages.
The major problems are the gaskets. Clean it with alcohol and put some vaseline on it.

Start with reassembling the silver knob. First put the gasket around the knob and insert the knob into the frame from the inside.

Step 35

As I mentioned above the biggest problems are the gaskets - the rubber gaskets as well as the little plastic washers under the heads of the crews. They are definitely damaged. If tightening the screws with force does not help you may try liquid gasket maker - but not too much.
Work carefully that no gasket maker gets into the chamber.

Step 36

If you use gasket maker don't forget to seal the screw heads.

Step 37

Remove excessive gasket maker immediately after assembling and wait until rubber has dried before doing another leakage test.

Don't forget to adjust the closing mechanism after reassembling. You do this with the adjustment screw. Check in close and open position.